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PATENT OF INVENTION

XIV. - Chemical arts.

3. - EXPLOSIVE POWDERS AND MATERIALS, PYROTECHNICS. **No. 465.082**

Improvements in explosives.

M. IVAN-BASIL-TARNOWSKI OF TARNOW, residing in France (Seine).

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It is well known that the group of explosives known as "dynamite" are based on nitroglycerin, to which is added other substances depending on various needs or applications. The purpose of this invention is the production of an explosive not containing nitroglycerin, one which is in several respects superior to dynamite, from the standpoint of power and also for other qualities.

To produce this explosive, instead of using nitroglycerin as the base, as in the case of dynamite, one uses a mixture of three materials as the base, to which various other materials are added depending on the application.

The three primary materials are:

1) metallic aluminum in powder form;

2) a nitro-hydrocarbon of the aromatic group, and

3) ammonium perchlorate, which supplies the oxygen.

It is known that pure aluminum releases around 7000 calories by oxidation; one uses it in order to expand the gases formed by the other materials. The nitro-hydrocarbons can be mono-, di-, or trinitrated compounds of benzene, toluene, and other analogues; in the case of aniline and methylaniline, one can advantageously use the tetra-nitrated compounds.

Sometimes one uses the liquid form of the nitrated hydrocarbons, with or without 3-4% soluble nitrocellulose or collodion, which gives the mixture a more plastic consistency.

The third element used as the base, ammonium perchlorate, is known to be an oxygen-rich, stable and nonhygroscopic material; yet it possesses the property of lowering the temperature of the explosive mixtures in which it is contained. For this reason, when used in combination with metallic aluminum, one avoids this shortcoming, and obtains an explosive equal in force to any of the dynamites.

As a sample use and application of this base, one can employ the following formula:

a) $5Al + C^6H^3(NO^2)^3 + {}_9NH^4ClO^4$

which contains approximately:

10% aluminum, 15% trinitrobenzene, and 75% ammonium perchlorate.

One finds it is sometimes necessary to add certain non-nitrated hydrocarbons to this formula, such as cellulose, sawdust, paraffin, wax, or other similar material; a suitable formula with this addition is as follows:

b) $6Al + C^6H^{10}O^5 + C^6H^3(NO^2)^3 + {}_{10}NH^4ClO^4$

which contains approximately:

10% aluminum, 10% sawdust or cellulose, 13% trinitrobenzene and 67% ammonium perchlorate.

As has been explained above, these mixtures produce good powerful explosives; but because of the release of free gaseous hydrochloric acid and chlorine when these explosives are exploded, they are not suitable for underground work, such as mining and tunneling. In order to neutralize the chlorine, one uses equivalent weights of ammonium perchlorate and an alkaline nitrate, of barium, potassium, or any similar

kind; in this way, the chlorine which would otherwise have been released combines with the alkaline base and forms the corresponding chloride.

As an example, the following formula is very suitable:

c) $$6Al + C^6H^{10}O^5 + C^6H^3(NO^2)^3 + 6KNO^3 + 6NH^4ClO^4$$

This formula contains approximately 9% aluminum, 9% sawdust or cellulose, 12% trinitrobenzene, 30% potassium nitrate, 40% ammonium perchlorate.

The materials indicated in this description are given only as examples; they may be replaced by materials of the same chemical group, and their proportions can also be varied, without leaving the invention.

SUMMARY.

This invention involves:

1) The fabrication of explosives based on powdered aluminum, nitro-hydrocarbon of the aromatic group, such as mono-, di-, or trinitrated compounds of benzene, toluene, or other analogues, and ammonium perchlorate.

2) In particular, the fabrication of explosives as specified under 1), in which the nitro-hydrocarbons used are tetranitrated compounds of aniline or methylaniline.

3) The adding to the nitrated hydrocarbons, of aniline or others as specified above, of soluble nitrocellulose or collodion to improve the plasticity of the mixture.

4) The adding to the mixture specified under 1) and 2) of nonhydrated hydrocarbons, such as cellulose, sawdust, paraffin, wax, or other similar material.

5) In order to neutralize the action of gaseous hydrochloric acid and chlorine released upon explosion of the above-specified explosives, the adding of an alkaline nitrate, whose base combines with the chlorine which is released, making it possible to employ the explosives according to the invention in mining, digging tunnels, and other similar work.

6) As a new product, the explosives produced under the above-specified conditions.

I.B.T. of TARNOW

Attorney:

Ch. MARDELET